14. (Unamended) Antenna arrangement according to claim 13, in which the waveguides in one of the distribution networks comprises tracks in a plate of conductive material.

REMARKS

This is in response to the Office Action dated March 25, 2002. Claims 1-14 are pending. Attached hereto is a marked-up version of the changes made to the specification and claim(s) by the current amendment. The attached page(s) is captioned "**Version With Markings To Show Changes Made.**"

The drawings, abstract, and specification stand objected to on page 2 of the Office Action. Proposed drawing changes are attached hereto, with the proposed changes being shown in red ink. Moreover, the specification and abstract have been amended herein as suggested by the examiner. In view of these amendments, it is respectfully submitted that all objections to the drawings, specification, and abstract have been addressed and overcome.

Claims 1-14 stand rejected under 35 U.S.C. Section 112, second paragraph. See page 3 of the Office Action. It is respectfully submitted that the claim changes herein address and overcome any potential issue in this regard.

Claim 1 stands rejected under 35 U.S.C. Section 102(b) as being allegedly anticipated by Goto (JP 4-105404). This Section 102(b) rejection is respectfully traversed for at least the following reasons.

Claim 1 requires (a) first and second waveguide branches comprised of respective *grooves defined in a plate of conductive material*, (b) said first and second waveguide branches each having at least one *through-going aperture in the part of the branch which overlaps the other branch, said through-going apertures extending through the plate*, and (c) wherein each aperture is arranged essentially at a *right angle* with respect to a main direction of extent of the corresponding branch. For example, see Fig. 1 of the instant application which illustrates that each branch comprises a groove formed in plate 100. Also illustrated are through-holes (e.g., 115-130) which are arranged at right angles to the main direction of extent of their corresponding branches. The cited art fails to disclose or suggest these aspects (a)-(c) of claim 1.

Goto discloses a circuit for a waveguide slot antenna, including slots 36. However, Goto fails to disclose or suggest requirements (a)-(c) of claim 1 discussed above. Thus, Goto cannot anticipate or otherwise render obvious the invention of claim 1.

For at least the foregoing reasons, it is respectfully requested that all rejections be withdrawn. All claims are in condition for allowance. If any minor matter remains to be resolved, the Examiner is invited to telephone the undersigned with regard to the same.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: _____
Joseph A. Rhoa
Reg. No. 37,515

JAR:caj
1100 North Glebe Road, 8th Floor
Arlington, VA 22201-4714
Telephone: (703) 816-4000
Facsimile: (703) 816-4100

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE ABSTRACT

ABSTRACT OF THE DISCLOSURE

The invention relates to a distribution network for electromagnetic signals, preferably for use in an antenna arrangement in the microwave range, comprising at least two waveguide branches, in which branches the electromagnetic signals propagate in different directions in relation to one another. The invention is characterized in that the [said] at least two waveguide branches overlap one another at one point in the distribution network. The waveguide branches in the distribution network which overlap one another are preferably neighbouring branches and have at least one aperture in the part of the branch which overlaps the other branch.

[(Fig. 1)]

IN THE SPECIFICATION

The paragraph beginning at page 1, line 11:

In[, for example,] a telecommunication system, there may be a requirement for using so-called point-to-multipoint antennas. This is a type of antenna which is used for a central node in the system to be able to communicate with a plurality

of other terminals in the system which are located within a certain angle sector. In other words, it is a requirement of an antenna of the said type to be able to generate a lobe which covers the desired angle sector.

The paragraph beginning at page 1, line 30:

A radiating element of [the said] this type is fed from a distribution network which normally has branches from one or more feed points from which the distribution network is provided with energy. A normal method of producing an aperture antenna is to construct the distribution network in waveguide technology and to arrange apertures along the branches of the distribution network. For the apertures to be excited, it is necessary that they are arranged eccentrically with respect to an imaginary centre line in the longitudinal direction of the distribution network. The eccentrically arranged apertures should also be arranged alternately with respect to the imaginary centre line. The eccentric placement of the apertures with respect to the feed network, which is necessary for them to function as antenna elements, however, entails a number of disadvantages, above all that a high degree of cross polarization between the antenna elements is produced, above all in vertical polarization. In antennas with horizontal polarization, the phenomenon of cross polarization is troublesome above all in systems which require a wide bandwidth in the antenna.

The paragraph beginning at page 2, line 15:

EP 788 186 discloses a device for use in antenna units, [said] such device comprising a first feeder network in stripline or microstrip technology, said first feeder network being laterally separated from a ground plane by an electrically isolating bearer. The ground plane comprises a number of apertures which are excited by the first feeder network. An improvement of this device would be to decrease its height.

The heading at page 2, line 22:

SUMMARY

The paragraph beginning at page 3, line 1:

These problems are solved with the aid of a distribution network for electromagnetic signals, preferably for use in an antenna arrangement in the microwave range, comprising at least two waveguide branches, in which branches the electromagnetic signals propagate in different directions with respect to one another, the [said] at least two waveguide branches overlapping one another at one point in the distribution network. The branches which overlap one another are suitably neighbouring branches in the distribution network.

The heading at page 3, line 32:

BRIEF DESCRIPTION OF THE FIGURES

The heading at page 4, line 16:

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The paragraph beginning at page 5, line 9:

Through-going apertures [115-122] 115, 116, 117, 118, 119, 120, 121 and 122, preferably in the shape of slots, intended to constitute radiating elements in the antenna, are arranged in the part of a respective branch which overlaps the neighbouring branch. It is suitably the end of the branches which overlaps a corresponding part of a neighbouring branch/neighbouring branches which means that the respective radiating element will end up at the end of its branch. It is noted that like reference numerals 115, 116, 117, 118, 119, 120, 121 and 122, numerals 123, 127, 128, 129 and 130 also refer to through-going apertures.

The paragraph beginning at page 8, line 1:

The electromagnetic signals enter the distribution network in the plate 330 through a connection and feed point 336 in the distribution network[335]. At this point, the distribution network is suitably connected to the external equipment

with which it is intended to cooperate, such as, for example, a telecommunication system.

The paragraph beginning at page 8, line 13:

Figure 4 shows an alternative 410 to the plate 100 in Figure 1 and the plate 310 in Fig 3, intended to be included in an antenna arrangement for vertical polarization. What has been described above concerning the plates 100 and 310 also applies to the plate 410, with the difference that since the antenna, in which the plate is to be included, is an antenna for vertical polarization, the apertures [415-422] 415, 416, 417, 418, 419, 420, 421 and 422 in the plate 410 have the same main direction of extension as the branches in the distribution network.

The paragraph beginning at page 8, line 21:

Furthermore, according to the invention, the apertures [415-422] 415, 416, 417, 418, 419, 420, 421, 422, 423 . . . 427, 428, 429 and 430 in the plate 410 are placed at a distance of ¾ λ_g from the end point of their respective branch, where λ_g is the wavelength of the electromagnetic signal in the waveguide. This distance is ½ λ_g more than normal but provides good characteristics, for example with respect to the bandwidth of the antenna. As in the Fig. 1 embodiment, energy is

conducted to the distribution network via feed points 411, 412, 413 and 414 (see points 111-114 in the Fig. 1 embodiment discussed above).

The paragraph beginning at page 8, line 27:

Figure 5 shows, like Figure 2, the plate with grooves on its reverse side. As can be seen in Figure 5, the apertures [415-422] 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429 and 430 are also preferably arranged as a group in the vertically polarized antenna, along an essentially straight line, which provides a low degree of cross polarization.

IN THE CLAIMS

1. (Amended) Distribution network for electromagnetic signals[, preferably] for use in an antenna arrangement in the microwave range, the distribution network comprising:

at least [two] first and second waveguide branches comprised of respective grooves defined in a plate of conductive material, in which branches the electromagnetic signals propagate in different directions with respect to one another so that the signals in the first branch propagate in a first direction and signals in the second branch propagate in a second direction different from the first direction, and

wherein [characterized in that] said [at least two] first and second waveguide branches overlap one another at a point in the distribution network, said [at least two] first and second waveguide branches each having at least one through-going aperture in the part of the branch which overlaps the other branch, said through-going apertures extending through the plate and each aperture being arranged essentially at a right angle with respect to a main direction of extent of the corresponding branch.

2. (Amended) Distribution network according to Claim 1, in which the first and second waveguide branches in the distribution network which overlap one another are neighbouring branches.

3. (Amended) Distribution network according to claim 1, in which at least one aperture in the [at least two] each of the first and second waveguide branches is included in a group of apertures which are arranged in an essentially straight line.

4. (Amended) Distribution network according to claim [1]3, in which a number of the apertures in the group are [intended] for [one and] the same polarization.

5. (Unamended) Distribution network according to Claim 4, in which the apertures in the group are intended for horizontal polarization.

6. (Amended) Distribution network according to Claim 5, in which the apertures in the group are situated at the end of [their] the respective branch in the distribution network.

7. (Unamended) Distribution network according to Claim 4, in which the apertures in the group are intended for vertical polarization.

8. (Unamended) Distribution network according to Claim 7, in which the apertures in the group are situated at a distance of ¾ λ_g from the end point of their respective branch, where λ_g is the wavelength of the electromagnetic signal in the waveguide.

9. (Unamended) Distribution network according to Claim 8, in which the apertures are constituted of apertures in a longitudinal wall of the waveguide.

10. (Amended) Distribution network according to claim 1, in which the apertures [are constituted of] comprise slots.

11. (Unamended) Distribution network according to claim 1, in which the waveguides comprise tracks in a plate of conductive material.

12. (Amended) Antenna arrangement comprising [a distribution network according to any of Claims 1-11,] a distribution network for electromagnetic signals, the antenna arrangement comprising:

at least first and second waveguide branches comprised of respective grooves defined in a plate of conductive material, in which branches the electromagnetic signals propagate in different directions with respect to one another so that the signals in the first branch propagate in a first direction and signals in the second branch propagate in a second direction different from the first direction, and

wherein said first and second waveguide branches overlap one another at a point in the distribution network, said first and second waveguide branches each having at least one aperture in the part of the branch which overlaps the other branch, said apertures extending through the plate and each aperture being

arranged essentially at a right angle with respect to a main direction of extent of the corresponding branch.

13. (Amended) Antenna arrangement according to claim [11]12, in which the distribution network is constructed in two layers with an intermediate aperture layer.

14. (Unamended) Antenna arrangement according to claim 13, in which the waveguides in one of the distribution networks comprises tracks in a plate of conductive material.